July 24, 1950

PRELIMINARY DRAFT

DEPARTMENT OF LABOR

List of Critical Occupations

In the preparation of the list of critical occupations, selection of specific occupations was made on the basis of the following considerations:

(a) The demand, in essential industries and activities for persons qualified to work in the occupations would exceed the total supply under conditions of full mobilization.

(b) A minimum training time of two years (or the equivalent in work experience) is necessary to the satisfactory performance of all the major tasks found in the occupation.

(c) The occupation is essential to the functioning of the industries or activities in which it occurs.

The list of critical occupations is in two parts: Part I provides occupational titles only; Part II includes definitions of the occupations. The definitions refer to the Dictionary of Occupational Titles of the United States Employment Service (1949 Edition) whenever possible.

PART I TITLES

PROFESSIONAL AND RELATED OCCUPATIONS

AGRONOMIST
ARCHITECT, MARINE
BACTERIOLOGIST
BIOLOGIST
BOTANIST
CHEMIST - Includes: Chemist, Analytical; Chemist, Biological; Chemist, Organic; Chemist, Physical; Chemist, Inorganic; Pharmacognosist; Pharmacologist;
CLINICAL PSYCHOLOGIST
DENTIST
ENGINEER - Includes:
ENGINEER, CHEMICAL - Includes only: Chemical Engineer; Ceramic Engineer
ENGINEER, CIVIL
ENGINEER, ELECTRICAL
ENGINEER, INDUSTRIAL
ENGINEER, MECHANICAL
ENGINEER, MINING
ENGINEER, PETROLEUM
ENGINEER, SANITARY
ENGINEER, CHIEF, MARINE
ENTOMOLOGIST
GEOLOGIST - Includes Geologist and Geophysicist
MASTER, SHIP
MATHEMATICIAN
METALLURGIST - Includes: Metallurgist, Extractive; Metallurgist, Physical
NURSE, PROFESSIONAL
OSTEOPATH
PARASITOLOGIST
PHYSICIANS AND SURGEONS
PHYSICIST
PLANT PATHOLOGIST
TEACHER (Critical Occupations Only)
TOOL AND DIE DESIGNER - Includes only: Die Designer; Tool Designer
VETERINARIAN

PART I TITLES

SKILLED OCCUPATIONS

AIRCRAFT AND ENGINE MECHANIC - Includes only: Aircraft Mechanic; Aircraft-Engine Mechanic; Airplane Mechanic
APPRENTICE (Critical Occupations Only)
BOILERMAKER - Includes: Boilermaker; Lay-Out Man; Fit-Up Man; Boiler-Shop Mechanic
BOILERMAKER, Marine
BRICKLAYER, REFRACTORY
COREMAKER
DRILLER, PETROLEUM - Includes: Cable Driller; Rotary Driller
DIE SETTER
ELECTRICIAN, AIRPLANE
FOREMAN (Critical Occupations Only)
GLASS BLOWER, LABORATORY APPARATUS
INSTRUMENT REPAIRMAN - Includes only: Instrument Repairman; Aircraft Instrument Man; Electrical Instrument Repairman
LAY-OUT MAN, MARINE
LOFTSMAN - Includes only: Loftsman, Marine; Mock-Up Assembler; Loftsman, Aircraft; Boilermaker-Loftsman
MACHINIST - Includes: Machinist; Bench Machinist; Instrument Maker; Laboratory Mechanic; Lay-Out Man; Marine Machinist; Job Setter
MAINTENANCE, MECHANIC
MILLWRIGHT
MODEL MAKER
MOLDER - Includes only: Molder, Bench; Molder, Finish; Molder, Floor; Molder, Pattern
PATTERNMAKER
PRECISION-LENS GRINDER - Includes only: Precision-Lens Grinder; Precision Lens Polisher
ROLLER, IRON AND STEEL
SHIP RIGGER
STILLMAN, PETROLEUM PROCESSING
TOOL AND DIE MAKER - Includes only: Die Maker; Tool Maker; Tool & Die Maker

PART II - DEFINITIONS*

Professional and Related Occupations

General Description of Group: This group includes professional, scientific and semi-professional occupations:

Professional occupations are concerned with the performance of supervisory, administrative or research work based upon the established principles of a profession or science. Such occupations require either extensive and comprehensive academic study or experience of such scope and character as to provide an equivalent background.

Scientific occupations require a command of the essential theoretical knowledge and experience in the techniques of accumulation, analysis and interpretation of data gathered under controlled conditions. Normally at least four years of study (leading to graduation with a major in a field of science) at an accredited college or university or equivalent significant experience is required for qualification as a scientist.

Semi-professional occupations are less demanding than professional or scientific occupations with respect to background or the need for initiative or judgment in dealing with complicated work situations. Semi-professional occupations are usually confined to relatively restricted fields of activity being concerned with the technical or mechanical details of the broader or more theoretical professional and scientific fields.

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*Abbreviations Appearing In the Definitions:

DOT - Dictionary of Occupational Titles Second Edition, U.S. Employment Service, 1949

The expression "related title" refers specifically to the uncoded titles listed in Vol. II DOT, which appear in capital letters, under a coded job title. Corresponding definitions for such titles appear in Vol. I of the DOT.

AGRONOMIST (Agronomist, 0-35.01 DOT P.12)
Conducts research in irrigation, fertilization, culture, and genetics of plants and crops; analyzes soil samples to determine soil substance, presence of acids or other injurious chemicals and makes recommendations to overcome unfavorable soil conditions; carries out experiments to develop improved yields of farm crops.

ARCHITECT, MARINE (Architect, Marine, 0-19.81 DOT P.28)
Prepares plans and designs of construction and repair of steel or wooden ships; uses his knowledge of the laws of water pressure, strength of materials, and design of structural steel frames, columns, arches and roof structures, especially as related to hulls, to plan and design the complete layout of a ship's interior, or the tearing down and reconstructing of interiors for special purposes, including the design of the installation of power, heating, ventilating, refrigerating, plumbing and lighting systems as applied to marine service; prepares all material specifications; may supervise the purchase and inspection of all materials.

BACTERIOLOGIST (Bacteriologist, 0-35.33, DOT P.51)
Conducts research in the science that deals with microorganisms, such as bacteria, viruses, protozoa and certain types of fungi; isolates and identifies microorganisms, and studies their morphology, physiology, and reactions to chemical, physical, and organic stimuli; studies their effects upon the cells, tissues, and organs of living organisms and their effect in the production of industrial compounds dependent upon bacterial action; detects the presence of bacilli found in conjunction with infectious disease; prepares antitoxin and vaccines; may be engaged in specific projects, such as analyzing food products for the presence of bacteria causing disease. This title includes all related titles with same Dictionary of Occupational Titles code number.

BIOLOGIST (Biologist, 0-35.22, DOT P.97)
Conducts research concerned with the origin, development, anatomy, functions, distribution, and other basic principles of plants and animals and the relationship between plant life and animal life. Usually specializes in research of a particular plant, animal, or aspect of biology. This title includes all related titles with the same Dictionary of Occupational Titles Code Number.

BOTANIST (Botanist, 0-35.23, DOT P.125)
Performs research concerned with the development, physiology, heredity, environment, distribution, structure, and economic value of plants for use in such fields as agronomy, forestry, horticulture, and medicine. Usually specializes in one of the following areas: (1) Discovers and develops both wild and cultivated plants which might prove of economic value as crops: grows plants under controlled conditions to determine best climatic, soil, and other essentials. Selects, tests, and cross-breeds plants to obtain optimum qualities and quantities of plants for use as foods, drugs, fibers, and other economic purposes. May explore foreign areas for plants of economic value to introduce at home; (2) Determines effect on distribution and type of plant growth of environmental elements, such as rainfall, temperature, sunlight, soil, elevation, and diseases; and (3) Dissects plants and applies his knowledge of plant parts and classification to identify accurately a flower, leaf, seed, or whole plant. Usually specializes in a major plant group, such as seed plants, algae, ferns, and mosses. This includes all related titles with the same Dictionary of Occupational Titles Code Number.

CHEMIST (0-07) General Definition
Performs analytical or research work of an experimental or applied nature in the field of chemistry, or directs or advises concerning the work of others in such performance. This may include supervision of manufacturing processes where chemical processes are involved as well as specialized consulting service; utilizes knowledge of the application of laboratory techniques, and of the laws, principles, and relationships pertaining to the composition and transformation characteristics of matter in cellular, molecular, atomic, and sub-atomic stages. Makes analyses and investigations in the field of organic chemistry, working with hydrocarbons or their derivatives; in inorganic chemistry, working with elements, mixtures, and compounds not containing carbons; in physical chemistry, studying quantitatively the relationship between the chemical and physical properties in organic and inorganic substances; in biological chemistry, studying the chemistry of living organisms to discover and apply chemical compounds and procedures to nourish, influence, or regulate physiological processes; in pharmacological chemistry, studying physiological, neurological, pathological, and toxic effects of drugs, gases, dusts, and other chemicals to develop and improve drugs and to devise remedies and preventive methods; and in industrial chemistry, carrying out chemical investigations in diversified manufacturing areas, such as coal, foods, medicines, textiles, and oil products to develop analytical methods and to set up standards for the control of products; may supervise other workers in laboratory research or industrial control activities and compile data on findings and prepare scientific reports. This definition includes: Chemist, Analytical; Chemist, Biological; Chemist, Organic; Chemist, Physical; Chemist, Inorganic; Pharmacognosist; Pharmacologist.

CHEMIST, ANALYTICAL - A chemist who specializes in determining the composition of inorganic and organic compounds or mixtures; conducts or supervises non-routine analytical tests to ascertain physical and chemical properties; controls composition and quality of raw and processed chemicals having ascertained by test results that they meet plant specifications; develops or improves analytical procedures to insure highest quality control. Usually specializes in one of the branches of chemistry, such as physical, biological, organic or inorganic.

CHEMIST, BIOLOGICAL (Chemist, Biological, 0-07.02, DOT P.242)
A chemist who specializes in the chemical processes of living organisms; ascertains reaction of foods, drugs, serums, hormones, and other substances on the tissues and vital processes of living organisms through laboratory experiments and tests.

(Chemist, Biological - cont'd)
Develops new or improved biological products and processing methods. Maintains standards of purity and quality of manufactured products by performing or supervising laboratory tests. This title includes all related titles with same Dictionary of Occupational Titles code number.

CHEMIST, ORGANIC (Chemist, Organic, 0-07.03, DOT P.243)
A chemist who specializes in materials whose essential constituent is carbon or its compounds; analyzes and tests materials such as dyes, paints, petroleum, rubber, textile, and other organic substances to determine composition or other physical and chemical properties. Develops process control methods and supervises testing of materials during processing. This title includes all related titles with same Dictionary of Occupational Titles code number.

CHEMIST, PHYSICAL (Chemist, Physical, 0-07.84, DOT P.243)
A chemist who specializes in the relationships between the chemical and physical properties in organic and inorganic compounds or mixtures, making use of heat, electricity, and light in his investigations; conducts and supervises assistants in laboratory tests. This title includes all related titles with the same Dictionary of Occupational Titles code number.

CHEMIST, INORGANIC (Chemist, Inorganic, 0-07.21, DOT P.242)
A chemist who specializes in non-carbon compounds; analyzes metals, ores, and other inorganic substances to determine such factors as composition, crystalline structure, working characteristics, and proportionate value of metallic content. Develops or improves methods for processing inorganic materials and prepares processing formulas. Makes chemical and physical tests on materials and products, or directs others in making such tests. This title includes all related titles with same Dictionary of Occupational Titles code number.

PHARMACOGNOSIST (Pharmacognosist, 0-07.86, DOT P.961)
Investigates the chemical and physical properties of crude drugs and medicinal plants to identify and classify them and to determine their value for the manufacture of pharmaceutical products. Collects data on cultivation, harvesting, marketing, storage, and geographical distribution of the products for use of pharmaceutical manufacturers. May conduct similar studies on non-medicinal substances, such as gums, resins, latexes, dyes, fibers, and other substances of vegetable or animal origin.

PHARMACOLOGIST (Pharmacologist, 0-35.34, DOT P.961)
Studies effects of drugs, gases, dusts, and other materials on tissue and physiological processes of animals and human beings; experiments with animals, to determine reactions of drugs and other substances on the functioning of organs and tissues. Standardizes drug dosages or methods of immunizing against industrial diseases. Investigates preventive methods and remedies for diseases, such as silicosis and lead, mercury, and ammonia poisoning. Analyzes food preservatives and colorings, vermin poisons, and other materials to determine their toxic or non-toxic properties. Standardizes procedures for the manufacture of drugs and medicinal compounds. Detects and identifies poisons causing death, infection, or illness.

CLINICAL PSYCHOLOGIST (Psychologist, Clinical, 0-36.22, DOT P.1039)
Applies psychological principles and techniques in the diagnosis and treatment of maladjusted persons; makes tests of educational achievement, intelligence, vocational aptitudes, and personality and uses other evaluation techniques. Carries out counseling and psychological therapeutic activities frequently in connection with psychiatrists, other physicians, and other professional groups, such as social workers and teachers; confers with psychi atrists, social workers, and other professional workers to plan the treatment of the psychological problems of maladjusted individuals; confers with representatives of schools, social agencies, and other institutions to secure information for diagnosis; may perform psychological research in the field of mental health or train other clinical psychologists in clinics and universities. A clinical psychologist is identified as an individual who meets one of the following criteria: (1) Is a diplomat in clinical psychology of the American Board of Examiners in Professional Psychology; (2) is a fellow of the Division of Clinical and Abnormal Psychology of the American Psychological Association; (3) holds a PHD degree in Psychology and is working in the field of clinical psychology.

DENTIST (Dentist, 0-13.10, DOT P.377)
A person of recognized education, experience, or legal qualifications engaged in the practice of dentistry, or any phase of dentistry, such as extraction, filling, cleaning, or replacing teeth; treating diseased tissue of the gums and performing surgical operations on jaw or mouth. May specialize in one particular phase of dentistry, or in the caring for teeth of children, or in x-ray analysis. This title includes all related titles with same Dictionary of Occupationa Title code number.

ENGINEER, CHEMICAL (0-15) General Definition
Performs one or more of the following functions in the general field of chemical engineering requiring fulfillment of educational, experience, or legal qualifications established by engineering colleges or licensing authorities; applies chemistry and the various branches of the engineering sciences to the design, construction, operation, and improvement of equipment for carrying out chemical and ceramic processes on a commercial scale; conducts research to develop new and improved chemical-manufacturing processes. Designs, plans lay-out, or supervises workers operating equipment, such as condensers, absorption and evaporating towers, columns and stills for producing synthetic rubber, soap, aluminum, high octane gasolines, plastics and other products whose manufacture involves chemical processes. Acts as a consultant or advisor in fields where he is expert. This definition includes only: Chemical Engineer; Ceramic Engineer.

CHEMICAL ENGINEER (Chemical Engineer, 0-15.01, DOT P.237)
Specializes in one or more of the following branches of chemical engineering: the design of chemical equipment, such as absorption towers, columns, condensers, and evaporators; the arrangement of industrial plants; the supervision of industrial processes, labor utilisation, and research in organic and heavy chemicals, ceramics, glass, petroleum refining, rubber, and textiles. This title includes all related titles with same Dictionary of Occupational Titles code number.

CERAMIC ENGINEER (Ceramic Engineer, 0-15.11, DOT P225)
Conducts research and directs the technical work in the manufacture of ceramic products, such as bricks, pottery, and glassware: tests physical, chemical, and heat resisting properties of various materials used in manufacture; selects combinations of materials for use in manufacture of ceramics according to the conditions under which the product is to be used; designs equipment and apparatus to improve methods of producing ceramic products; determines the temperature at which the shaped ceramic is to be baked and the manner in which it is to be glazed; tests samples of finished products for such characteristics as texture, coloring, and glazing, to determine if prescribed standards are met. Often specializes in one branch of ceramic work, such as glass production or crockery production.

ENGINEER, CIVIL (Civil Engineer, 0-16.01, DOT P.258)
Performs one or more of the following functions in the general field of civil engineering requiring fulfillment of educational, experience, or legal qualifications established by engineering colleges or licensing authorities: Plans, designs, and supervises construction and maintenance of a large variety of structures and facilities, such as roads, railroads, airports, bridges, harbors, channels, dams, irrigation projects, pipe lines, power plants, water and sewage systems, and waste disposal units. This title includes all related titles with the same Dictionary of Occupational Titles code number.

ENGINEER, ELECTRICAL (Electrical Engineer 0-17.01, DOT P.447)
Performs one or more of the following functions in the field of electrical engineering requiring fulfillment of educational, experience or legal qualifications established by engineering colleges or licensing authorities: plan and supervise construction and operation of electric-power generating plants, transmission lines, and distribution systems; plan and supervise construction and installation of illumination, wire communication, and electric transportation systems; design and develop radio, television, electronic and allied equipment; design and supervise manufacture of various types of electrical machinery and apparatus, such as motors and generators, converters and regulators, switch gear, and welding equipment. May also specialize in research, consulting, inspection, testing, teaching at the university level, specification and other technical writing, and sales and service of complex electrical equipment. This title includes all related titles with the same Dictionary of Occupational Titles code number.

ENGINEER, INDUSTRIAL (Industrial Engineer 0-18.01, DOT P.688)
Performs one or more of the following functions in the field of industrial engineering requiring fulfillment of educational, experience, or legal qualifications established by engineering colleges of licensing authorities: supervise production departments of manufacturing plants; lay out machinery and apparatus and determine flow of work for most efficient production; conduct and interpret time-and-motion studies; devise means and set up programs to curb industrial accidents and fires; set up personnel policies and procedures and evaluate jobs; and devise and install accounting and inventory-control systems. This title includes all related titles with the same Dictionary of Occupational Titles code number.

ENGINEER, MECHANICAL (0-19) General Definition
Performs one or more of the following functions in the field of mechanical engineering requiring the fulfillment of educational, experience, or legal qualifications established by engineering colleges or licensing authorities: Designs and supervises the manufacturing and maintenance of such equipment as tools, engines, industrial machinery, and refrigeration and air conditioning apparatus: performs research and development to improve mechanical devices, such as gasoline and Diesel engines, steam turbines, industrial furnaces, rolling-mills, and propeller assemblies. Creates designs, writes specifications, and supervises installation and maintenance of complex mechanical equipment in industrial plants, mines, steam power plants, ocean-going vessels and similar establishments. Plans and supervises operation of distribution systems for heat, ventilation, gas, water, and steam. This definition includes all job titles included in the Dictionary of Occupational Titles Code group 0-19. Illustrative of such job titles are Mechanical Engineer; Aeronautical Engineer; Agricultural Engineer; Marine Engineer; and Automotive Engineer.

ENGINEER, MINING (Mining Engineer, 0-20.01, DOT p. 858) Performs one or more of the following functions in the general field of mining engineering requiring fulfillment of educational, experience, or legal qualifications established by engineering colleges or licensing authorities; makes surveys of coal or other mineral deposits or undeveloped mines; examines deposits or mines to determine whether they can be worked profitably, making geological and topographical surveys to determine location, size, and slope of deposits and character of surrounding strata. Lays out plans for development of property, including shaft, drift, or slope location, breaker or tipple location, water supply, and power requirements. Determines method of mining best suited to character, type, and size of deposits, including type of machinery and equipment to be used. Makes safety and efficiency surveys of mine work to determine safer working conditions and to coordinate work of men and methods so as to secure maximum production. This title includes all related titles with the same Dictionary of Occupational Titles code number.

ENGINEER, PETROLEUM (Petroleum Engineer, 0-20.11 DOT p. 960) Performs engineering work concerned with drilling of wells and production of oil or gas: studies geological surveys, earth samples, and other data and advises on type of derrick and drilling equipment to be used for drilling new or reworking old wells. Supervises drilling operations and offers technical advice to achieve economical and satisfactory progress. Directs testing of bore holes to determine pressures, temperatures, direction of drilling, strata encountered, and other factors. Recommends and supervises use of drilling mud and casing cement, and directs gun perforating, squeeze cementing, and other special techniques and tools to solve drilling problems. Devises methods for bringing wells into production and controlling flow of oil or gas and for re-establishing flow by artificial means after natural flow has ceased. Recommends procedures for treating oil to remove sediment and water. Supervises maintenance and cleaning of producing wells. Determines gas-oil ratios of producing wells and designates allowable flow of oil or gas to meet proration regulations. Compiles logs for each well, production records on flowing wells, and other data. Conducts special studies on problems, such as salt water encroachment and operating equipment. May conduct geological and geophysical surveys. This title includes all related titles with the same Dictionary of Occupational Titles code number.

ENGINEER, SANITARY (Sanitary Engineer 0-16.01, DOT p. 1149)
Designs and supervises waterworks; sewage, garbage, and trash disposal plants; drainage systems; insect and rodent control projects; and other hygienic programs: plans development of watersheds and supervises building of aqueducts, filtration plants, and storage and distribution systems for water supply. Supervises swamp drainage, insect spraying, and design of insectproof buildings. Advises industrial plants in disposal of obnoxious gases, oils, greases, and other chemicals. Inspects and regulates sanitary condition of public places, such as markets, parks, and camps.

MARINE ENGINEER (Marine Engineer, 0-19.81, DOT p. 827)
Designs and supervises construction and installation of mechanical equipment, such as engines and heating, lighting, and ventilation systems of ships, docks, and other marine equipment. Operates machinery on trial runs. May prepare plans and designs for construction and repair of ships.

ENGINEER CHIEF, MARINE 0-88.21 (Engineer Chief, Marine, 0-88.21 DOT p. 470)
Has complete charge of all engines, boilers, electrical equipment, refrigerating equipment, sanitary equipment, deck machinery, and steam connections aboard ship; Keeps log of performance of equipment on voyage. Requisitions supplies and repairs. Oversees fueling of ship. Takes inventories of all stores and materials. Supervises others repairing equipment.

ENTOMOLOGIST (0-35.30, DOT p. 474)
Conducts research concerning insects and their relation to plant and animal life: Identifies and classifies all species of insects and allied forms. Aids in control and elimination of harmful pests, such as Japanese beetles, fruit flies, gypsy and browntail moths, and forest insects by developing new and improved insecticides and biological methods, including use of birds, natural parasites, and other enemies which prey upon destructive insects. Develops means to encourage growth and spread of beneficial insects, including bees and those insects used as food by birds and fish. Studies insect distribution and habitat and recommends methods to prevent importation and spread of injurious types.

GEOLOGIST - General Definition
Studies the constitution, structure, and history of the earth's crust; conducts research into the formation and dissolution of rock layers, analyzes fossil and mineral content of layers, and endeavors to fix historical sequence of development by relating characteristics to known geologic influences. Studies dynamic processes of great internal pressures and heat, volcanic disturbances, and air, water and glacial erosion, bringing about changes in the earth's crust. Studies seismic, gravitational, electrical, thermal and magnetic phenomena to determine structure and composition of earth's surface. Employs theoretical knowledge and research data to locate mineral, oil, and gas deposits, and to determine the probable area, slope, and accessibility of lodes. Prepares reports, maps, and diagrams of regions explored. This definition includes only: Geologist, Geophysicist.

GEOLOGIST (Geologist 0-35.63, DOT p. 605)
Studies the constitution, structure, and history of the earth's crust; employs theoretical knowledge and research data to locate mineral, oil, and gas deposits, and to determine the probable area, slope, and accessibility of lodes. Conducts research into the formation and dissolution of rock layers, analyzes fossil and mineral content of layers, and endeavors to fix historical sequence of development by relating characteristics to known geologic influences. Studies dynamic processes of great internal pressures and heat, volcanic disturbances, and air, water, and glacial erosion, bringing about changes in earth's crust. Prepares reports, maps, and diagrams of regions explored. This title includes all related titles with the same Dictionary of Occupational Titles code number.

GEOPHYSICIST (Geophysicist 0-35.65, DOT P.606)
Studies seismic, gravitational, electrical, thermal, and magnetic phenomena to determine structure and composition of earth, and forces causing movement and warping of surface. Investigates origin and activity of glaciers and volcanoes, and the course and phenomena of earthquakes. Charts ocean currents and tides; takes measurements concerning shape and movement of earth, and acoustic, optical and electrical phenomena in the atmosphere; employs theoretical knowledge and research data to locate petroleum and mineral deposits. Establishes fixed points over the surface of the earth for use in making navigational charts and maps. Predicts communication and atmospheric conditions. May specialize in a particular phase of the work, as exploration, administration, research, consulting, design, or teaching at the university level. This title includes all related titles with the same Dictionary of Occupational Titles code number, except Seismologist; Techtonophysicist; and Volcanologist.

SHIPMASTER (Master, O-88.02, DOT p.831)
Persons licensed by the Government to have complete charge of and responsibility for any vessel or watercraft requiring licensed officers. Licenses are issued only to persons possessing rigidly defined qualifications, after they pass examinations conducted by the Bureau of Marine Inspection and Navigation of the U. S. Department of Commerce. The types of licenses issued depend upon the type of craft, size of craft, and waters to be navigated. Typical of the duties of jobs covered by this classification are responsibility for safe navigation of ship, supervision of officers and crew, keeping a day-by-day log of events and happenings, and looking after safety of passengers and crew in disasters. This title also includes Mates who hold a Master's license. This title does not include Port Captains; Tugboat Captains; Dredge Captains; Ferryboat Captains; and Mates holding such licenses.

MATHEMATICIAN (Mathematician, O-35.76, DOT p. 833)
Solves and directs the solutions of problems in higher mathematics, which may be incidental to investigative, developmental, and research work in scientific fields such as engineering, physics, and astronomy. Determines mathematical principles involved and most efficient methodology to solution of problems. Acts as an advisor or consultant on application of mathematical analysis to scientific problems. May conduct research projects to discover new or improved methods for application of mathematical theory or analysis to new or unexplored areas of scientific investigation.

METALLURGIST (General Definition)
Originates and develops methods of extracting metals from their ores, and analyzes properties and treatment of metals to develop new alloys, new uses for metals and alloys, and methods for producing them commercially, or directs or advises concerning the work of others in such performance. This may include supervision of manufacturing processes where chemical processes are involved as well as specialized consulting service; improves and controls flotation, smelting, electrolytic, and other processes used in winning metals from their ores, for producing iron and steel, or for refining gold, silver, zinc, copper, and other metals. Conducts microscopic, X-ray, spectroscopic studies of metals and alloys, such as stainless steel, cast iron, and nonferrous alloys, to determine their physical characteristics, such as crystalline structure, dispersion of alloy particles through the basic metal, and presence of impurities, fractures, and other defects in metal samples. Develops rolling and heat-treating processes to obtain desired characteristics, such as ductility, malleability, lightness, and strength. This definition includes: Metallurgist, Extractive; Metallurgist, Physical.

METALLURGIST, EXTRACTIVE (Metallurgist, Extractive, 0-14.10 DOT - p.844)
Originates, controls, and develops flotation, smelting, electrolytic, and other processes used in winning metals from their ores, for producing iron and steel, or for refining gold, silver, zinc, copper, and other metals: Studies ore-reduction problems to determine most efficient methods of producing metals commercially. Controls temperature adjustments, charge mixtures, and other variables in blast furnace operations to obtain pig iron and steel of specified qualities. Investigates methods of improving metallurgical processes, as in the reduction of alumina by electrolytic methods to produce aluminum, the distillation of molten ore to purify zinc, or selective oxidation methods to extract lead, nickel, mercury, and other nonferrous metals from their ores.

METALLURGIST, PHYSICAL (Metallurgist, Physical, 0-14.20, DOT, p.844)
Investigates properties and treatment of metals to develop new alloys, new uses for metals and alloys, and methods for producing them commercially: conducts microscopic, X-ray, and spectroscopic studies of metals and alloys, such as stainless steel, cast iron and nonferrous alloys, to determine their physical characteristics, such as crystalline structure, dispersion of alloy particles through the basic metal, and the presence of impurities, fractures, and other defects in metal samples. Develops rolling and heat-treating processes to obtain desired characteristics, such as ductility, malleability, lightness, and strength. Tests alloys in pressure devices and other apparatus to insure their compliance with prescribed standards. Consults with engineers and officials to develop methods of manufacturing alloys at minimum costs. Experiments with techniques and materials involved in conversion of pressed metallic powders into iron, tungsten, magnesium, and other products. This title includes all related titles with the same Dictionary of Occupational Titles Code number.

OSTEOPATH (Osteopath, 0-39.96, DOT p. 914)
Diagnoses, prescribes for, and treats diseases, disorders, and conditions of the human body, in accordance with the State laws regulating the practice of Osteopaths. Specializes in manipulative procedures for the detection and correction of disorders and affections of the bones, muscles, nerves, blood vessels, and other tissues of the body structure. Employs auxiliary medical appliances, devices, and other aids to diagnose, and to support, immobilize, or otherwise adjust bodily impairments.

NURSE, PROFESSIONAL (O-33) General Definition
Performs various nursing duties requiring prescribed education, experience, and skill in the art of caring for ill and injured persons: Does general nursing work in homes or in hospitals, infirmaries, sanitariums, or other institutions. Administers medicines, ointments, and drugs as instructed by a PHYSICIAN. Observes symptoms, takes and records the temperature, pulse, and respiration of patients, and charts these according to standard practice. Changes dressings on wounds or injuries. Bathes and massages invalid persons. Feeds helpless patients. Serves meals as prescribed to patients. Prepares operating room. Sterilizes instruments. Gives injections or other treatments as prescribed by PHYSICIAN. This title includes all titles in the DICTIONARY OF OCCUPATIONAL TITLES code group O-33.

PARASITOLOGIST (Parasitologist O-35.31, DOT p.945)
Conducts research on animal parasites to determine manner in which they attack human beings and animals and effects produced. Studies characteristics, habits, and life cycles of parasites and investigates modes of transmission from host to host. Develops methods and agents with which to combat parasites or treat infections. May specialize in study of one variety of parasite or in development of drug and chemical agents for parasite control. This title includes all related titles with the same Dictionary of Occupational Titles Code number.

PHYSICIAN AND SURGEON (O-26) A General Definition.
A person of recognized experience, education, and legal qualifications engaged in such phases of medicine as diagnosing, prescribing medicine for, and otherwise treating diseases and disorders of the human body, and performing surgery. These persons often specialize in treating certain diseases or parts of the body. This title includes all titles in the Dictionary of Occupational Titles code group O-26, typical of which are Physician; Surgeon; Anesthetist; Intern: Pathologist; Medical Physiologist.

PHYSICIST (Physicist, O-35.73, DOT p.965)
Conducts research in the various phases of physical phenomena of matter, motion and energy; performs experiments in specialized areas such as the fields of mechanics, heat, light, sound, electricity, magnetism, electronics and ionics, radio, molecular, atomic and nuclear physics and biophysics. Applies fundamental principles of the science to industrial problems using highly precise and delicate measuring instruments. May perform research to discover new or unproved methods for application of physical theory or analysis to new or unexplored areas of scientific investigation. This title includes all related titles with the same Dictionary of Occupational Titles Code number.

PLANT PATHOLOGIST (Plant Pathologist, 0-35.26 DOT p. 985)
Conducts research in the nature, cause and control of plant diseases and decay of plant products: Studies healthy and diseased plants to determine symptoms of and organism causing diseased condition. Isolates organism, studies its habits and life cycle, and devises methods of destroying or controlling it. Tests possible control measures under laboratory and field conditions for comparative effectiveness, practicality, and economy. Investigates comparative susceptibility of different varieties of a plant and develops varieties immune to the disease. Studies rates of spread and intensity of disease under different conditions of soil, climate, and geography, and predicts outbreaks of plant diseases. Determines kinds of plants and insects that harbor or transmit disease. Studies losses from deterioration of perishable plant products in transit or storage and develops practices to prevent or reduce losses. Determines presence of disease-producing organisms in seed stocks to reduce losses from seed-borne diseases. May specialize according to type of plant affected, such as cereal crops, fruit, or forest trees, or by type of disease, such as bacterial, virus, or fungus.

TEACHER (Critical occupations only)
Instructs students in colleges or universities, or apprentices or other workers in essential industries or activities, for the purpose of developing skills and knowledges essential and unique to the performance of critical occupations. The subjects taught may include both the theory and procedure of job performance. Usually specializes in instruction pertaining to one occupation, one aspect of an occupation, or a field of study common to a number of critical occupations. Employs, singly or in combination, such teaching methods as lecture, discussion, supervised study, supervised practice, or actual job performance. Usually a qualified worker in the occupational field. May combine practice or research in the occupational field with teaching duties.

TOOL AND DIE DESIGNER (0-48) General Definition
Plans, sketches, and makes detailed drawings of tools, dies, jigs, fixtures, and gages: Determines type and kind of tool or die required. Draws freehand pencil sketch showing top, front, and side views of tool or die. Makes detailed drawings of each component part, indicating the exact dimensions and the allowances and tolerances for the parts as well as specifying materials and other engineering details. This definition includes only: Die Designer; Tool Designer.

DIE DESIGNER (Die Designer, 0-48.42, DOT p.385)
Makes drawings of dies necessary to form a complete stamping, forging, or other part; decides on the number of sets of dies (each set representing a stage of development of the part to be made) necessary to change the metal blank into the finished piece, basing his decisions on a blueprint of the finished part and on his knowledge of dies, machines, their possibilities and limitations; makes scale drawings of each set of dies; compares blueprints with wooden patterns of dies to determine if corrections, changes, or improvements should be made in patterns. This title includes all related titles with the same Dictionary of Occupational Titles code number.

TOOL DESIGNER (Tool Designer, 0-48.41, DOT p. 1391)
Designs special tools and fixtures, such as boring bars and milling-machine tools. Frequently is a Machinist, using types of machines for which he is designing tools. This title includes all related titles with the same Dictionary of Occupational Titles code number.

VETERINARIAN (Veterinarian, 0-34.10, DOT p.1455)
Diagnoses and treats, surgically or medically, injuries, diseases and other disorders of animals: tests dairy herds for tuberculosis and inoculates animals against disease, such as hogs against cholera, and dogs against rabies; performs autopsies on dead animals to determine cause of death; inspects animals intended for human food before or after slaughtering; advises on the care and breeding of animals.

SKILLED OCCUPATIONS

General Description of Group: Skilled occupations include craft and manual occupations which require predominantly a thorough and comprehensive knowledge of processes involved in the work, the exercise of considerable independent judgment, usually a high degree of manual dexterity and in some instances extensive responsibility for valuable products or equipment. Workers in these occupations usually become qualified by serving apprenticeships or extensive training periods.

AIRCRAFT AND ENGINE MECHANIC (5-80) General Definition
Overhaus, services, and inspects airplanes and airplane engines: (1) Repairs, replaces, and assembles such parts as wings, fuselage, tail assembly, landing or flotation gears, control cables, fuel and oil tanks, and lines. Removes damaged parts and installs replacements from stock, or duplicates wooden and metal parts, performing necessary welding, metal fitting, covering, doping, rigging, and woodworking operations. (2) Examines external appearance of engines and listens to them in operation to detect sounds indicative of malfunctioning.

Replaces worn or damaged parts, such as cylinders and carburetors, while engines are still mounted in airplanes. Removes engines from airplanes, disassembles them, and checks all parts for wear, warping, or other defects. Repairs and replaces damaged parts, and reassembles and reinstalls engines. Performs miscellaneous duties to service engines, such as flushing crankcase, cleaning strainer screens, and greasing moving parts. Must hold license from Civil Aeronautics Authority as Aircraft-Engine Mechanic or Aircraft-and-Engine Mechanic. This definition includes only: Aircraft Mechanic; Aircraft-Engine Mechanic; Airplane Mechanic.

AIRCRAFT MECHANIC (Aircraft Mechanic, (Air trans.), 5-80.120 DOT p.15)
Inspects, overhauls, and services airplanes except engines: repairs, replaces, and assembles such parts as wings, fuselage, tail assembly, landing or flotation gears, control cables, fuel and oil tanks, and lines; removes damaged parts and installs replacement from stock, or duplicates wooden and metal parts; performs necessary welding, metal fitting, covering doping, rigging, and woodworking operations. Must hold license from Civil Aeronautics Authority as Aircraft Methanic. This title includes all related titles with the same Dictionary of Occupational Titles Code number.

AIRCRAFT-ENGINE MECHANIC (Aircraft-Engine Mechanic, 5-80.130) DOT p.14)
Inspects, services, repairs, and overhauls airplane engines: examines external appearance of engines and listens to them in operation to detect sounds indicative of malfunctioning; replaces worn or damaged parts, such as cylinders and carburetors while engines are still mounted in airplanes; removes engines from airplanes, disassembles them, and checks all parts for wear, warping, or other defects; repairs or replaces defective parts, and reassembles and reinstalls engines; performs miscellaneous duties to service engines, such as flushing crankcase, cleaning strainer screens, and greasing moving parts. Must hold license from Civil Aeronautics Authority as Aircraft-Engine Mechanic. This title includes all related titles with the same Dictionary of Occupational Titles Code number.

AIRPLANE MECHANIC (Airplane Mechanic, 5-80.100, DOT p.18)
Overhauls, services, and inspects airplanes and airplane engines: inspects and repairs airplanes in shops and on the line. Inspects, services, adjusts, and overhauls airplane engines. Must be licensed by the Federal Government. This title includes all related titles with the same Dictionary of Occupational Titles code number.

APPRENTICE General Definition
Any Apprentice in training in a critical occupation under a program which is being conducted in substantial conformance with the standards of a State or the Federal Apprenticeship Agency who shall have served satisfactorily at least one year of his term of training.

BOILERMAKER (4-83) General Definition
Performs any or all machine and hand operations necessary to fabricate and assemble boilers, tanks, vats, and other vessels made of heavy steel plates: lays out and marks on steel plates all curves, lines, points, dimensions, and directions for subsequent machine operations, utilizing a knowledge of trigonometry and tank and boiler design. Cuts plates to size and shape. Punches holes in plates for bolts and rivets. Bends angle irons or plates to desired radius. Forms flanges on plates. Forms concave plates for boiler or tank heads. Forms or shapes plates in bulldozer. Assembles headers, tubes, baffle plates, and other parts, riveting or welding parts together. Calks seams and rivets heads. Chips burrs from plate edges. Fastens boiler tubes or flues into headers, expanding tube ends with an expanding tool. Is capable of using forging tools, machines, and equipment. This definition includes: Boilermaker; Lay-Out Man; Fit-Up Man; Boilershop Mechanic.

BOILERMAKER (Boilermaker, 4-83.100, DOT p. 115)
Performs any or all machine and hand operations necessary to fabricate and assemble boilers, tanks, vats, and other vessels made of heavy steel plates: lays out work on plates; cuts plates to size and shape; punches holes in plates for rivets or bolts; bends angle irons or plates to desired radius; forms flanges on plates; forms concave plates for boiler or tank heads; forms or shapes plates in bulldozer; bends plates; assembles headers, tubes, baffle plates, and other parts, riveting or welding parts together; calks seams and rivet heads; chips burrs from plate edges; fastens boiler tubes or flues into headers, expanding tube ends with an expanding tool. This title includes all related titles with the same Dictionary of Occupational Titles code number.

LAY OUT MAN (Lay-Out Man, 4-83.200, DOT p. 763)
Lays out and marks on steel plates all curves, lines, points, dimensions, and directions for subsequent machine operations that are necessary for fabricating parts of boilers, tanks, and vats; draws layout to scale as outlined on blueprints; utilizes knowledge of trigonometry, and tank and boiler design in making layout.

FIT-UP MAN (Fit-up Man, 4-83.300, DOT p. 534)
Assembles and temporarily fits together in the shop, the various parts of boilers, tanks, vats, and other vessels preparatory to final assembly by Boilermaker; bolts or tack welds, seams of boiler shells, or other parts; hammers out or files irregularities in parts so that they will fit together neatly and snugly.

BOILER SHOP MECHANIC (Boiler Shop Mechanic, 4-83.400, DOT p. 116)
Performs, or is capable of performing, any of the machine and hand operations necessary to fabricate parts of boilers, vats, and other vessels from heavy steel plates, such as forming concave plates; flanging plates; rolling plates and angles to arcs of a circle; and fitting together the various parts preparatory to final assembly.

BRICKLAYER, REFRACTORY (Bricklayer, Refractory Brick, 5-24.130, DOT p.143)
Repairs and relines brickwork of converters, cupolas, furnaces, ovens, flues, ladles, and tapping spouts: removes burned or damaged brick; cleans surface and lays refractory brick in place, sealing joints with mortar to bind bricks together; makes provisions for expansion joints in linings of furnaces; replaces damaged bricks or patches portions of furnaces with fire clay; replaces arched roof of furnaces, using frame to support brickwork; patches or replaces firebrick lining of ladles and tapping spouts of furnaces. This title includes all related titles with same Dictionary of Occupational Titles code number.

COREMAKER (Coremaker (found.), 4-82.010, DOT p.326)
Makes sand cores used in molds to form hollows or holes in metal castings; cleans core box and dusts parting sand over inside of core box to facilitate removal of finished core; packs and rams core sand solidly into core box; sets vent wires and reinforcing wires as sand rises in box; lifts box from core, leaving core on plate for handling and drying; repairs breaks in core with spoon; sends core to baking oven to harden it for use in foundry molds. May bake cores to harden them. May assemble cores of more than one part. This title includes all related titles with same Dictionary of Occupational Titles code number.

DRILLER, PETROLEUM General Definition
Supervises drilling operations for oil and gas wells. This definition includes: Cable Driller; Rotary Driller.

CABLE DRILLER (Cable Driller, 5-75.270, DOT p. 171)
Supervises set-up and drilling operations, and operates the controls of a cable-drilling rig which is used to drill oil and gas wells: Directs drilling rig which is used to drill oil and gas wells: Directs work of setting up boiler, machinery, and derrick. Regulates stroke of walking beam by which cable, with attached drilling bit, is alternately raised and dropped to shatter rock at bottom of hole (well). Carefully adjusts temper screw which controls the impact or force with which bit strikes bottom of well, frequently grasping cable to judge "bite". Selects and changes bits and assembles string of drilling tools on end of cable. Removes drillings from well with bailer, operating cable-hoisting machinery. Examines drillings brought up by bailer to determine nature of strata encountered. Assists in connecting sections of casing or tubing and manipulates levers and brakes to lower it into well. Fishes for and removes equipment lost in well, using special tools attached to the end of the cable. May start flow of oil or gas by assisting in lowering and setting off a charge of explosive at bottom of well. Controls flow of well when it is brought in (first begins flowing) by capping it or regulating control valves. Keeps record of nature and location of st strata encountered, number of feet drilled per shift, and materials used. Supervises and assists other workers in set-up of rig, and in maintenance and repair of machinery, tools, and equipment. This title includes all related titles with the same Dictionary Of Occupational Titles code number.

ROTARY DRILLER (Rotary Driller, 5-75.050, DOT P.1113)
Supervises drilling operations and operates draw works that serve as a power distribution center for the raising and lowering of drill pipe and casing, and for rotation of drill pipe in the well: Manipulates levers and throttles to control speed of rotary table which rotates string of tools, and to regulate the pressure of the tools at the bottom of the well as indicated by a gage. Connects and disconnects sections of drill pipe as they are run into or out of well. Selects drill bits according to nature of strata encountered and changes them when dull or when strata changes. Manipulates levers, pedals, and brakes to control draw works which supply power necessary to lower and raise drill pipe and casing into and out of well. Checks operation of slush pumps to see that fluid, which cools bit, removes cuttings, and seals walls of well with clay, is circulating properly and is of correct consistency. Inspects core or cuttings from well to determine nature of strata drilled through. Fishes for and removes equipment lost in well, using special tools at the end of drill pipe or cable. Keeps record of location and nature of strata, number of feet advanced per shift, and materials used. May start flow of well by assisting in lowering and setting off a charge of explosives in the strata. Controls flow of well when it comes in (first begins flowing) by capping it or regulating control valves. Inspects operation of machinery and repairs or replaces worn or broken parts. Supervises and is assisted by other workers. This title includes all related titles with the same Dictionary of Occupational Titles code number.

DIE SETTER (Die Setter (forging), 4-76.120, DOT p. 387
Sets up dies in bulldozers, drop hammers, power brakes, power presses, and other forging machines, and adjusts them to normal operation: removes used dies from machine and cleans scale or dirt from bed; selects proper dies and bolts upper (male) die to movable block and lower (female) die in approximate center of bed or anvil of machine; adjusts female die to get an exact fit with male die; clamps female die in place and adjusts length of stroke of male die; operates machine to forge a few trial pieces, inspects them, makes adjustments, and turns machine over to operator. This title includes all related titles with same Dictionary of Occupational Titles Code number.

ELECTRICIAN, AIRPLANE (Electrician, Airplane (air trans.), 4-97.915 (DOT p.454)
Maintains and repairs airplane electrical equipment, such as wiring, conduits, electrical instruments, and small motors; removes defective equipment, such as motors and conduits; examines conduits before or after their removal from the airplanes for breaks and weak places; replaces defective conduit segments; inspects and tests junction boxes, rewires airplanes and installs new conduits, arranging wiring and conduits so that they do not become entangled or otherwise interfere with fuel lines or other equipment; replaces electric motors, and tests and repairs defective motors; tests and repairs airplane lighting systems, including wiring, running and landing lights, and cabin lights. Must hold license from Civil Aeronautics Authority.

FOREMAN (Critical Occupations Only) Foreman, I, DOT p. 553)
Supervises a group of workmen engaged in a critical occupation; interprets blueprints, sketches, written or verbal orders; determines procedure of work; assigns duties to craftsmen and inspects their work for quality and quantity. May keep time, production, and other records; employ, train, and discharge workers; assist subordinates during emergencies or as a regular assigned duty; set up or inspect equipment preparatory to regular operators; and perform related duties of supervisory or minor administrative nature. Must be skilled in the particular craft in which he functions.

GLASS BLOWER , LABORATORY APPARATUS (Glass Blower, Laboratory Apparatus, 4-65.440, DOT p. 608)
Makes scientific apparatus, such as retorts, stills, and flasks from glass tubing, blows heated tubing into specified forms, shaping, bonding, or joining together sections of blown tubing to make completed apparatus Usually works from blueprints.

INSTRUMENT REPAIRMAN (5-83) General Definition
Repairs and adjusts electrical and mechanical recording, regulating, and control instruments, such as pressure, flow, and combustion meters, altimeters, tachometers, and gyro compasses: disconnects inaccurate or damaged instrument and replaces it. Dismantles instrument and replaces worn or broken parts or makes new ones. Assembles instrument and installs it on testing apparatus. Calibrates instrument to coincide with established standards. Inspects all instruments periodically and makes necessary adjustments. This definition includes only: Instrument Repairman; Instrument Man; Electrical Instrument Repairman.

INSTRUMENT REPAIRMAN (Instrument Repairman, (Any ind.) I, 5-83.971 DOT p. 706)
Installs, repairs, and adjusts recording, regulating, and control instruments, such as pressure, flow, and combution meters and gages: Disconnects inaccurate or damaged instrument and replaces it. Dismantles instrument and replaces worn or broken parts with new ones. May make new parts or repair old ones. Assembles instrument and installs it on testing apparatus. Calibrates instrument to coincide with an established standard. Inspects all recording instruments periodically and makes necessary adjustments. May adjust and repair mechanism and valves of automatic control devices.

AIRCRAFT INSTRUMENT MAN (Instrument Man (air trans.,Aircraft Mfg.) 5-83.972, DOT p. 705)
Removes, tests, repairs, calibrates, and reinstalls aircraft instruments, such as air speed indicators, gyro compasses, altimeters, turn and bank indicators, tachometers, and engine and carburetor temperature indicators; makes new parts if replacement parts are not available. A thorough knowledge of the functions and operations of the various instruments is required. Must have appropriate license from Civil Aeronautics Authority or work must be approved by inspector having an appropriate license from Civil Aeronautics Authority. This title includes all related titles with same Dictionary of Occupational Titles code number.

ELECTRICAL INSTRUMENT REPAIRMAN (Electrical Instrument Repairman, (any ind.) 5-83.975, DOT p. 449)
Cleans, adjusts, repairs, and calibrates electrical instruments and control devices, such as voltmeters, recording gages, relays, thermostats, motor-starting boxes, and other precision electrical apparatus. Job requires a combination of the skills of a machinist and an electrician. This title includes all related titles with the same Dictionary of Occupational Titles code number.

LAY OUT MAN, MARINE (Lay-Out Man I, Ship and Boat Building Repair, 5-05.530 DOT p. 763)
Marks off metals and ship plates to indicate the exact position of all holes, and to indicate the shaping and bending operations; working from drawings or templates, spots and indicates any part of the layout for various machine operations and for bench and floor workers, using precision measuring tools, and his knowledge of applied mathematics.

LOFTSMAN General Definition
Lays out to scale, wood, paper, and sheet metal templates, models and molds of structural units for such items as boilers, tanks, ships, boats, aircraft and aircraft parts: produces outline and form of structure on wood, sheet metal, or paper in accordance with drawings, sketches, blueprints, engineering data, and other instructions. Transfers floor lay out to working drawings or to wood or metal stock. Fabricates molds and templates with appropriate wood or metal-working tools. Marks fabricating instructions, such as position of rivet holes and other structural details, on molds, templates, or working drawings. Includes only: Loftsman, Marine; Mock-up Assembler; Loftsman, Aircraft: Boilermaker-Loftsman.

LOFTSMAN, MARINE (Loftsman, (ship, and boat bldg, & Rep.), 5-17.210, DOT p. 792)
Lays out to full scale, on the mold loft floor, the lines of a ship and developes and makes full size wooden or paper templates or molds to conform to these layouts, using his knowledge of geometric construction and developments, and using hand and woodworking machine tools. May construct working models of vessels. This title includes all related titles with same Dictionary of Occupational code number.

MOCK-UP ASSEMBLER (Mock-Up Assembler, 5-17.240, DOT p. 863)
Constructs and assembles the full-sized, wooden replicas of airplanes from which are made the sectional jigs used in production assembly: working from blueprints, prepares the basic "mock-up" frame from planks and timbers; completes "mock-up" by fashioning parts, such as the frame ribs and longitudinal contour strips according to lay-out and fastens them in place.

LOFTSMAN, AIRCRAFT (Loftsman, 5-17.245, DOT p. 791)
Lays out to scale on plywood or sheet metal the lines of an airplane and its component elements preparatory to the making of blueprints and tools; makes preliminary layouts in reduced scale of exterior surface contours from engineering data and sketches; similarly lays out full-scale drawings of airplane structural units, such as fuselages and wings, working from engineering designs and loftings in reduced scale; prepares tables of full-scale offsets of lofted airplane structures for shop use.

BOILERMAKER LOFTSMAN (Boilermaker Loftsman, 5-17.350, DOT p. 116)
Lays out on the mold loft floor, from scale drawings and blueprints, full-scale shapes and dimensions of boilers and their component parts such as tanks and uptakes (metal conduits to convey smoke and hot gases from boiler to smoke stack), and constructs full size wooden or paper templates and molds, utilizing his knowledge of geometric construction and development; transfers floor layout measurements to appropriate stock and fabricates molds and templates; marks fabricating instructions on the molds. May measure or make sketches on shipboard for certain boiler equipment to aid in the layout work.

MACHINIST (4-75) General Definition
Carries through to completion the construction and repair of all kinds of metal parts, tools, machines, mechanical instruments, and ordnance equipment: sets up and operates all machine tools including lathes, milling machines, planers, shapers, and specialized machines that have been developed from them. Assembles and installs machines, equipment, and sub-assemblies. Understands blueprints and written specifications. Possesses knowledge of shop mathematics, and the use of charts and tables, the planning of shop work, and the dimensions and uses of standard bolts, screws, threads, and tapers. Is familiar with the working properties of such metals as aluminum, brass, cast and wrought iron, and various steels and is capable of shaping metal parts to dimensions within close tolerances. This definition includes: Machinist: Bench Machinist Instrument Maker; Laboratory Mechanic; Lay-Out Man; Marine Machinist; Job Setter.

MACHINIST (Machinist, 4-75.010, DOT p. 804)
Carries through to completion the construction and repair of all kinds of metal parts, tools, and machines: understands blueprints and written specifications; uses all machinist's hand and machine tools and precision measuring instruments. Possesses knowledge of shop mathematics, the use of charts and tables, the efficient planning of shop work, the dimensions and uses of standard bolts, screws, threads, and tapers; must be familiar with the working properties of such metals as aluminum, brass, cast and wrought iron, and various steels, and is capable of shaping metal parts to precise dimensions within the close tolerances prescribed. This title includes all related titles with same Dictionary of Occupational Titles code number.

BENCH MACHINIST (Machinist, Bench, 4-75.120, DOT p. 805)
Performs various duties involved in fitting and assembling machines, equipment, and subassemblies, using hand and machine tools: assembles and fits parts together; lays out position of holes to be drilled during course of assembling; drills and reams holes to accurate size, or broaches them to size; fits or matches the various parts and fastens them together. This title includes all related titles with same Dictionary of Occupational Titles code number.

INSTRUMENT MAKER (Instrument Maker II, 4-75.130, DOT p. 704)
Specializes in the construction, alteration, or repair of mechanical instruments or the mechanical portions of electrical and optical instruments, requiring highly skilled workmanship and extreme accuracy for observations and scientific operations in the field for which the instrument is to be made; works from drawings, blueprints, rough sketches, or oral instructions; operates precision machinery of all kinds; brazes, welds, solders, hardens, anneals, and tempers metals; works in iron, steel, copper, aluminum, platinum, silver, nickel or any alloy, bakelite, ivory, bone, glass or other material; paints, lacquers, enamels, engraves, or otherwise finishes instruments and cases. This title includes all related titles with same Dictionary of Occupational Titles code number.

LABORATORY MECHANIC (Laboratory Mechanic, 4-75.132, DOT p. 736)
Plans, lays out, and makes complex parts and assemblies of experimental apparatus in a research laboratory: makes parts, models, and mounts of experimental electron-tube devices and other electrical equipment; constructs and assembles mechanical portions of instruments; sets up dies and supervises drawing commerical and experimental alloy wires to required dimensions; lays out, wires, and tests electrical circuits.

LAY OUT MAN (Lay-Out Man, (mech.shop), 4-75.140, DOT p. 763;
(4-75.141, DOT p. 844)
Locates and marks guide line and reference points on metal parts or castings to indicate material to be removed in machining. May remove excess metal using machine shop tools and equipment. Uses precision measuring instruments. Understands blueprints and specifications and possesses a knowledge of shop mathematics

MACHINIST, MARINE (Machinist, Outside, 4-75.150 DOT p. 806)
Installs such machinery in a ship as propelling machinery, steam, Diesel, or electric auxiliaries, pumps, cargo-handling machinery, anchor-handling gear, ventilating and fire-fighting equipment, steering gear, and armament, working from blueprints and using hand and portable tools: install below-deck auxiliaries, such as evaporators, stills, heaters, pumps, condensers, and boilers, and connects them to steam pipe systems; completes the installation of temporarily connected piping systems in machinery spaces; lays out holes required for the passage of connections such as shafting and steam lines, through bulkheads, decks, and other surfaces; tests and inspects installed machinery and equipment during dock and sea trials. May use machine shop tools as lathe, boring mill, planer, shaper slotter, and milling machine. May repair ship machinery

JOB SETTER (Job Setter (Mach.Shop), 4-75.160, DOT p. 718
Installs cutting tools in various types of automatic or semi-automatic machinery; adjusts guides, stops, working tables of machine, and other controls to handle the size of stock to be machined; operates and adjusts machine he sets up until accurate production (based on blueprinting specifications, patterns, or templates) has been achieved; checks production with precision gages, often to tolerances of 0.0005 inch; turns machine over to regular operator when it is producing satisfactorily. This title includes all related titles with same Dictionary of Occupational Titles code number.

MAINTENANCE MECHANIC General Definition
Keeps machinery and mechanical equipment of an establishment in a state of good repair: Examines machines for defects in operation, locating faulty parts by listening to machine while it is in operation or by other methods based on his mechanical knowledge. Dismantles or partially dismantles machine to gain access to defective part and removes part, using various hand tools such as wrenches, screw drivers, and pliers. Reassembles machine, making necessary adjustments to insure efficient operation. Is usually required to have a knowledge of the operation of machines he repairs.

MILLWRIGHT (Millwright, 5-78.100, DOT p. 855)
Changes the lay-out and set-up of machines and mechanical equipment in a plant or mill wherein the machinery is usually of the heavy type, and keeps the machines and equipment in efficient operating condition: performs duties such as dismantling, moving, installing, or repairing machines, power shafting, pulleys, conveyors, hoist, and other equipment. Is primarily concerned with installing, changing lay-out, and setting up machines, usually of the heavy type, rather than with keeping them in a state of good repair.

MODEL MAKER (5-17) General Definition
Constructs miniature or full-scale models and working models of aircraft, automobiles, electrical equipment, and small metal objects: lays out objects to be produced on wood or metal stock, according to blueprints or other specifications. Shapes and removes excess material, using a variety of metal and woodworking tools. Assembles component parts and joins them together. Checks finished models for accuracy with precision measuring devices. This definition includes all titles in the DICTIONARY OF OCCUPATIONAL TITLES code group 5-17 except FORM & JIG MAKER (fabric. plastics prod.) 5-17.061; PATTERNMAKER (furn.) 5-17.080; MODEL MAKER (jewelry) 5-17.262; MOLD MAKER (jewelry) 5-17.310. See also PATTERNMAKER.

MOLDER (4-81) General Definition
Makes sand molds by hand, for use in forming metal castings and finishes machine-made molds: places molds in suitable flasks and packs, and smooths green sand, dry sand, or loam around them. Makes metal mold patterns by forming sand molds around wooden patterns, and pouring molden metal into the mold. Finishes halves or sections of sand molds made by machine by smoothing and reshaping damaged surfaces, opening and cleaning mold channels and vents, applying facing material to mold surfaces, drying and hardening mold surfaces, and assembling mold halves or sections for pouring. This definition includes only: Molder, Bench; Molder, Finish; Molder, Floor; Molder, Pattern.

MOLDER, BENCH (Molder, Bench, 4-81.010, DOT p. 866)
Makes molds on a bench by hand by packing, ramming, compacting, and smoothing green sand, dry sand, or loam around patterns.

MOLDER, FINISH (Molder, Finish, 4-81.020, DOT p. 866)
Assembles and repairs halves or sections of sand molds made by machine molders; sprays sections of mold with graphite solution and dries surface; opens and cleans sprue and riser; punches holes to vent mold for escape of gas during pouring; repairs breaks in mold; assembles halves or sections of mold.

MOLDER, FLOOR (Molder, Floor, 4-81.030, DOT P. 867)
Makes molds for bulky castings on foundry floor by packing, ramming, compacting and smoothing green sand, dry sand, or loam around patterns which have been placed in suitable flasks. May make symmetrical molds or sections of molds by the sweep method. This title includes all related titles with same Dictionary of Occupational Titles code number.

MOLDER, PATTERN (Molder, Pattern, 4-81.040, DOT P. 868)
Casts metal patterns in aluminum, bronze, or other soft metals (the more durable metal pattern is used instead of a wood pattern when a large number of duplicate castings are to be made.) Makes one or more sand molds, using a wood pattern to form the mold impression of the metal pattern to be cast; pours molten aluminum, bronze or other non-ferrous metal into molds; machines metal patterns to exact dimensions. May make the wood patterns used to form the sand molds in which the metal patterns are cast.

PATTERNMAKER (5-17) General Definition
Builds forms, fixtures, jigs, patterns, templates, core boxes, and match plates for use as guides or standards in the fabrication of wood or metal units or parts in such establishments as metal foundries, planing mills, and airplane or automobile manufacturing plants: lays out fixtures or patterns to be produced on wood or metal stock according to blueprints or other specifications. Shapes and removes excess material with standard wood and metal-working tools. Assembles component parts of units. Checks finished items for accuracy with precision measuring devices. This definition includes all titles in the DICTIONARY OF OCCUPATIONAL TITLES code group 5-17 except FORM & JIG MAKER (fabric. plastics prod.) 5-17.061; PATTERNMAKER (furn.) 5-17.080; MODEL MAKER (jewelry) 5-17.262; MOLD MAKER (jewelry) 5-17.310. See also MODEL MAKER.

PRECISION LENS GRINDER (5-08) General Definition
Makes prisms, mirrors, and lenses used in optical instruments: grinds optical elements to precise size and shape. Inspects prisms during grinding and polishing operations for quality of surface, pit marks, and freedom from scratches. Checks accuracy of prism angles with precision gages and corrects angles where necessary. Polishes lens surfaces usually working to tolerances of .00001. Determines optical center of lens; inspects finished lenses and prisms, checking dimensions and curvature and locating defects. This definition includes only: Precision-Lens Grinder; Precision-Lens Polisher.

PRECISION-LENS GRINDER (Precision-Lens Grinder, 5-08.071, DOT p. 1018) Performs all or any of the following duties in the preparation of precision optical elements; rough grinds blanks or optical glass stock to general size and shape; blocks work in plaster or other compound for precision finishing; fine grinds elements to precise size and shape; polishes surfaces to very fine tolerances; grinds edges of lenses and reticles to fit holders; frequently inspects and measures work. May cement lens elements together to obtain corrected lens assemblies. May mount optical elements in holders or adapters for application to instruments.

PRECISION-LENS POLISHER (Precision-Lens Polisher, 5-08.081, DOT p. 1018) Polishes lenses, prisms, and similar optical elements to fine tolerances; inspects shapes of elements, using special testing devices; works to tolerances of .00001 inch. This title includes all related titles with same Dictionary of Occupational Titles code number.

ROLLER, IRON & STEEL General Definition
Operates the complex controls of a rolling mill, in which iron and steel ingots or billets are rolled into such shapes as bars, T's, rails, and sheets, by throwing the correct electric switches when signaled, or by personal observation: Watches rolling process closely to obtain smooth mill operation. Starts and stops various motors that drive the rolls between which iron and steel is passed to shape it or reduce it to specified thickness, constantly watching for any emergency signals.

SHIP RIGGER (Ship Rigger, 5-05,570) DOT p. 1202
Installs all tackle and fittings of wire and Manila rope on a ship and fabricates and installs shroud stays, lifts, braces, life lines, and radio aerials, and other rigging fitted to masts, spars, and booms; lays out and cuts materials according to specifications; splices wire cable and Manila rope when necessary and splices or otherwise attaches necessary fittings onto rigging using hand tools; fabricates essential wooden and rope assemblies; secures rigging in place; tests ship rigging and crane lifting rigging on shipboard for proper functioning. May install canvas work, such as tarpaulins, hatch coverings, and boat, gun and bunk covers on board ship. May sew canvas parts by machine or by hand.

STILLMAN, PETROLEUM PROCESSING
Is in charge of the operation of a combination of such processing units as atmospheric, pressure or vacuum distillation; thermal or catalytic cracking; polymerization; continuous coking, gas recovery and stabilization; treating, hydrogenation; dehydrogenation, or combined units such as thermal cracking and reforming; thermal and catalytic polymerization; alkylation; solvent extraction; or vapor and gas recovery plants, to process crude oil, aviation and motor gasoline, fuel oils, synthetic rubber raw materials, coke, asphalt, etc. Is responsible for operating personnel, training of personnel, quality and yield of products produced, interpretation of instrument readings and laboratory reports, supervision of maintenance and repair of equipment. This definition includes all titles in the Dictionary of Occupational Titles Code Group 4-55.

BOILERMAKER, MARINE (Boilermaker, (Ship & Boat Bldg. & Rep.), 4-84.013, DOT P. 115)
Repairs damaged hull, bulkhead and deck plates: removes defective rivets; reams and alines rivet holes and drives new rivets; removes damaged plates and either constructs a wooden template from the damaged plate, or takes measurements so that a new plate can be fabricated; installs new plates in place of those removed. Occasionally performs similar tasks in the repair of ship boilers, condensers, and evaporators, and in the replacement and repair of equipment, such as loaders, gratings, and stacks.

TOOL AND DIE MAKER (4-76) General Definition
Constructs and repairs dies, jigs, fixtures, and gages. Studies blueprints, model, work sketch, or other instructions to determine specifications. Selects stock and lays out guide lines and reference points to indicate material to be removed in machining. Determines requirements and sequence of machining operations. Sets up metalworking machines and shapes workpiece to required specifications. Chips, files, and scrapes surfaces of machined parts to close tolerances and assembles component parts. Examines worn tool or die to determine necessary repairs. Disassembles part and performs required machining operations to refinish tool or die, making necessary replacement parts to restore tool or die to original specifications. Checks accuracy of gages and measuring devices, using Johansen blocks or other precision gages, and makes necessary adjustments to bring them within specified tolerances. This definition includes only: Die Maker; Tool Maker; Tool and Die Maker.

DIE MAKER (Die Maker II, 4-76.010, DOT p. 386)
Specializes in the construction, repair, and maintenance of dies for forging, punching, stamping, or other metal-forming work. This title includes all related titles with the same Dictionary of Occupational code number.

TOOL MAKER (Tool Maker, 4-76.210, DOT p. 1394)
Specializes in the construction, repair, maintenance, and calibration of machine shop tools, jigs, fixtures, and instruments. This title includes all related titles with the same Dictionary of Occupational code number.

TOOL AND DIE MAKER (Tool and Die Maker, 4-76.040, DOT p. 1390)
Constructs, repairs, and maintains machine shop tools, jigs, fixtures, and instruments and also dies used for forging, punching, stamping, and other metal-forming work. This title includes all related titles with same Dictionary of Occupational Titles code number.
